

Utah.—Promontory, 8.5.
Vermont.—Lunenburg, 22; Strafford, 20.5; Woodstock, 20; Newport, 19.5; Dorset, 14.2; Burlington, 9; Charlotte, 5; Post Mills, 4.
Virginia.—Bird's Nest, 9.0; Norfolk, 6.4; Bruington, 6; Marion, 5; Blacksburg, 4; Cape Henry, 3.9; Dale Enterprise, 3.5.
West Virginia.—Helvetia, 17.8; Wellsburg, 8.5.
Wisconsin.—Embarras, 10.8; Franklin, 10; Neillsville, 9.5; Sussex, 8.8; Manitowoc, 7.0; Madison, 5.3; La Crosse, 3.6.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF THE MONTH.

[Expressed in inches and tenths]

Colorado.—Pike's Peak, 8.
Connecticut.—North Colebrook, 9; Norfolk, 4; Hartford, trace.
Dakota.—Fort Buford, trace.
Iowa.—Guttenburg, trace.
Kansas.—Atchison, trace.
Maine.—Gardiner, 20; Orono, 12; Eastport, 10; Waterville, 3; Portland, trace.
Maryland.—Fallston, trace.
Massachusetts.—Rowe, 26; Deerfield, 10.5; Leicester, 1; Williamstown, drifts; Boston, Amherst, Princeton and Readville, trace.
Michigan.—Marquette, 41; Mackinaw City, 36; Boyne, 30; Manistique, 29; Moorestown, 25; Traverse City, 15; Swartz Creek, 10; Grand Haven, 7; Ionia, 6; Northport, 3.2; Alpena, 3; Port Huron, 1.5; Ann Arbor, 0 to 12; Detroit, 0 to 2; Escanaba, trace.
Minnesota.—Saint Vincent, 3; Duluth, 1; Saint Paul and Northfield, trace.
Montana.—Fort Maginnis, trace.
New Hampshire.—Mount Washington, 24; Contoocook, 9.
New Mexico.—Santa Fé, 30 inches in mountains, none in valleys.
New York.—North Volney, 18; Palermo, 11; Humphrey, 8; Penn Yan, 6; Le Roy, 4 to 6; Cooperstown, 2.5; Oswego, Auburn, and Rochester, drifts; Albany, Buffalo, Ithaca, Menand Station, and Mountainville, trace.
Ohio.—Ruggles, drifts; Toledo, Wauseon, and Hiram, trace.
Pennsylvania.—Grampian Hills, 12; Dyberry, 7; Wellsboro, 4.5; Mahanoy Plane, 4; Chambersburg, Catawissa, Quakertown, Wilkes Barre, Troy, and Drifton, trace.
Vermont.—Woodstock and Charlotte, 18; Post Mills, 12; Dorset, 11; Burlington, 4; Strafford, 3.
Wisconsin.—Embarras, 16; Neillsville, 4; La Crosse, trace.

SLEET.

Colorado.—Pike's Peak, 25th, 26th.
Dakota.—Yankton, 3d; Webster, 3d, 27th.
Georgia.—Atlanta and Augusta, 18th.
Indiana.—Sunman, 30th; Indianapolis, 1st, 3d, 6th, 7th, 10th.
Iowa.—Dubuque, 1st; Guttenburg, 5th.
Kansas.—Independence, 16th.
Maryland.—Emmitsburg, 12th.
Minnesota.—Duluth, 31st; Saint Vincent, 13th; Fort Snelling, 3d.
Missouri.—Lamar, 21st.
Montana.—Fort Assinaboine, 2d.
New York.—Rochester and Oswego, 15th.
North Carolina.—Smithville, Wilmington, and Scott's Hill, 18th; Charlotte, 23d.
Ohio.—Cincinnati, 10th; Cleveland, 30th.
Tennessee.—Nashville, 22d; Memphis, 17th, 21st, 22d.

HAIL.

Hail is reported to have fallen in the following states and territories:

Alabama.—Birmingham and Greensboro, 12th.
Arizona.—Fort Bowie, 12th; Fort Apache, 14th; Prescott, 24th, 25th.

Colorado.—Montrose, 12th, 22d, 26th, 27th.
Dakota.—Fort Yates, 3d; Fort Randall, 5th; Fort A. Lincoln, 29th; Fort Meade, 27th, 29th.
Georgia.—Athens, 27th.
Illinois.—Riley, 14th; Anna, 28th.
Indiana.—Vevay, 14th, 29th; LaFayette, 30th.
Kansas.—Sherlock, 23d.
Louisiana.—Liberty Hill, 27th; Point Pleasant, 28th.
Montana.—Fort Benton, 4th.
Nevada.—Carson City, 18th.
New Mexico.—Lava, 1st.
Ohio.—Yellow Springs, 14th; Garrettsville, 30th.
Oregon.—Lakeview, 10th; Fort Klamath, 10th.
Tennessee.—Nashville, 6th.
Texas.—Fort Stockton, 14th; Cleburne, 11th; Fort Davis, 1st, 10th.
Wisconsin.—Embarras and Sussex, 14th.

PRECIPITATION FROM A CLOUDLESS SKY.

Key West, Florida: from 9.10 to 9.23 p. m. on the 7th Light rain fell when no clouds were visible except along the southern horizon and below an altitude of 30°.

Hiram, Portage county, Ohio: snow fell from a clear sky on the evening of the 10th.

Bloomington, Illinois: shortly after midnight of the 14-15th, when the sky was entirely clear, snow fell for about thirty minutes, covering the ground to the depth of about three-fourths of an inch.

WINDS.

The most frequent directions of the wind during March, 1885, are shown on chart ii. by arrows flying with the wind. In the upper Mississippi and Missouri valleys, east Gulf states, and Tennessee they were from the northwest; in the lake region, Ohio valley, and on the Atlantic coast they were generally from the northwest to southwest; in the west Gulf states, Rocky mountain regions, and on the Pacific coast they were variable.

HIGH WINDS.

(In miles per hour.)

During the month of March velocities of fifty or more miles per hour were recorded at stations as follows:

On the summit of Mount Washington, New Hampshire, 84, sw., 1st; 68, nw., 2d; 62, nw., 5th; 62, nw., 6th; 80, nw., 9th; 92, w., 10th; 84, nw., 11th; 76, nw., 12th; 56, w., 14th; 80, sw., 15th; 76, w., 16th; 72, w., 17th; 116, nw., 20th; 128, nw., 21st; 88, nw., 22d; 68, nw., 24th; 68, w., 25th; 50, w., 26th; 80, sw., 27th; 71, w., 28th; 76, n., 29th; 70, n., 30th; 83, w. and sw., 31st.

Pike's Peak, Colorado, 58, w., 4th; 72, nw., 6th; 52, w., 17th; 52, w., 22d; 50, n., 28th; 64, w., 29th; 53, w., 30th.

Cape Mendocino, California, 56, se., 8th; 56, se., 17th.

Sandy Hook, New Jersey, 53, nw., 10th.

Fort Buford, Dakota, 58, w., 2d.

Fort Shaw, Montana, 53, w., 15th.

Rochester, New York, 52, w., 15th.

Buffalo, New York, 56, sw., 9th; 56, sw., 15th.

Kitty Hawk, North Carolina, 52, ne., 22d.

Fort Macon, North Carolina, 60, sw., 29th.

Tatoosh Island, Washington Territory, 50, e., 7th.

LOCAL STORMS AND TOENADOES.

Navo, Denton county, Texas: a tornado occurred at this place at 5 p. m. on the 11th; no persons were killed, but several were injured; five dwellings, a store, and numerous out-buildings were destroyed. The tornado cloud moved in a northeasterly direction.

Gainesville, Cooke county, Texas: a tornado occurred eight miles southeast of this place at 4 p. m. on the 11th; its path was from 1,320 to 2,640 feet in width. Two dwellings, together with much fencing were destroyed. The tornado moved in a northeasterly direction; it was preceded by a thunder-storm, and was accompanied by hail and rain.

Van Alstyne, Grayson county, Texas: at eight p. m. on the

11th, a tornado occurred seven miles south of this place. The tornado cloud was funnel-shaped and the direction of movement was easterly, its path being about one hundred and fifty feet in width. No loss of life occurred, but several persons were injured. Five freight cars were blown from the railroad track and destroyed.

Zion, Lowndes county, Mississippi: at 6.30 p. m. on the 12th, a tornado occurred near this place. The cloud was funnel-shaped and moved in an easterly direction, causing much damage to buildings, fences and timber. The tornado's path was ten miles long and its width nine hundred feet.

Pulaski, Giles county, Tennessee: a tornado passed over a portion of this town at 4.20 p. m. on the 12th. Its path was about one-half mile in length and one hundred feet wide. About twenty buildings were unroofed and many trees and fences were blown down.

Greenville, Muhlenburg county, Tennessee: a violent storm of rain and hail accompanied by thunder and lightning occurred between 8 and 9 p. m. on the 27th. About two inches of water fell in fifteen minutes; fields were badly washed.

At 3.45 p. m. on the 27th a tornado passed in an easterly direction through Mitchell county, Georgia, for a distance of about twenty-five miles; several persons were injured; five houses, several cabins, and much fencing were destroyed.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the table below are shown the danger points in the rivers at the various stations, the highest and lowest stages for March, 1885, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, March, 1885.

[Expressed in feet and tenths]

| Stations. | Danger-point on gauge. | Highest water. | | Lowest water. | | Monthly range. |
|------------------------------|------------------------|----------------|---------|---------------|---------|----------------|
| | | Date. | Height. | Date. | Height. | |
| <i>Red River:</i> | | | | | | |
| Shreveport, Louisiana..... | 29 9 | 17 | 19 2 | 1, 2 | 16 8 | 2 4 |
| <i>Arkansas:</i> | | | | | | |
| Fort Smith, Arkansas..... | 15 0 | 2 | 6 5 | 23 | 0 3 | 6 2 |
| Little Rock, Arkansas..... | 23 0 | 4 | 15 0 | 25, 20 | 8 7 | 6 9 |
| <i>Missouri:</i> | | | | | | |
| Yankton, Dakota..... | 24 0 | 21 | 10 8 | 19 | 5 1 | 5 7 |
| Omaha, Nebraska..... | 18 0 | 10 | 12 2 | 20 | 8 4 | 3 8 |
| Leavenworth, Kansas..... | 20 0 | 16 | 12 2 | 24 | 9 6 | 2 4 |
| <i>Mississippi:</i> | | | | | | |
| Saint Paul, Minnesota..... | 14 5 | ..... | ..... | ..... | ..... | ..... |
| La Crosse, Wisconsin..... | 24 0 | ..... | ..... | ..... | ..... | ..... |
| Dubuque, Iowa..... | 16 0 | ..... | ..... | ..... | ..... | ..... |
| Davenport, Iowa..... | 15 0 | ..... | ..... | ..... | ..... | ..... |
| Keokuk, Iowa..... | 14 0 | 14 | 14 5 | 30 | 6 1 | 8 4 |
| Saint Louis, Missouri..... | 32 0 | 16 | 24 2 | 1 | 7 6 | 16 6 |
| Cairo, Illinois..... | 40 0 | 18 | 31 6 | 1 | 10 2 | 15 4 |
| Memphis, Tennessee..... | 41 0 | 20, 21 | 24 0 | 1, 2 | 10 2 | 13 8 |
| Vicksburg, Mississippi..... | 34 0 | 27, 28 | 34 6 | 7, 8 | 22 5 | 12 1 |
| New Orleans, Louisiana*..... | -3 0 | 28, 29, 30 | -3 5 | 10, 11, 13 | -6 2 | 2 7 |
| <i>Ohio:</i> | | | | | | |
| Pittsburg, Pennsylvania..... | 22 0 | 3 | 8 9 | 26 | 2 0 | 6 9 |
| Cincinnati, Ohio..... | 50 0 | 6 | 25 6 | 31 | 9 7 | 15 9 |
| Louisville, Kentucky..... | 25 0 | 5 to 8 | 10 0 | 29 | 6 0 | 4 0 |
| <i>Chamberland:</i> | | | | | | |
| Nashville, Tennessee..... | 40 0 | 19 | 13 5 | 12 | 7 1 | 6 4 |
| <i>Tennessee:</i> | | | | | | |
| Knoxville, Tennessee..... | ..... | 16 | 6 0 | 25, 26, 30 | 2 3 | 3 7 |
| Chattanooga, Tennessee..... | 33 0 | 18 | 9 2 | 12 | 5 0 | 4 2 |
| <i>Monongahela:</i> | | | | | | |
| Pittsburg, Pennsylvania..... | 29 0 | 3 | 8 9 | 26 | 2 0 | 6 9 |
| <i>Savannah:</i> | | | | | | |
| Augusta, Georgia..... | 32 0 | 30 | 15 0 | 23 to 27 | 7 5 | 7 5 |
| <i>Mobile:</i> | | | | | | |
| Mobile, Alabama..... | ..... | 17 | 18 0 | 14 | 15 0 | 3 0 |
| <i>Sacramento:</i> | | | | | | |
| Red Bluff, California..... | ..... | 1 to 4 | 2 2 | 29, 31 | 1 4 | 0 8 |
| Sacramento, California..... | ..... | 1, 2 | 16 0 | 31 | 13 9 | 2 1 |
| <i>Willamette:</i> | | | | | | |
| Portland, Oregon..... | ..... | 1 | 9 0 | 10 | 4 5 | 4 5 |
| <i>Colorado:</i> | | | | | | |
| Yuma, Arizona..... | ..... | 24, 25 | 18 0 | 1, 2, 3 | 14 4 | 3 6 |

* Below high-water mark of 1874 and 1883. † Frozen the entire month. ‡ Frozen part of month—see text.

The Mississippi river remained frozen throughout the month at Davenport, Iowa, and to the northward; at Keokuk the ice gave way on the 14th, on which date the water rose to one-half foot above the danger line.

The Missouri river was frozen at Yankton, Dakota, from the

1st to 13th; at Omaha, Nebraska, from the 1st to 9th; and at Leavenworth, Kansas, from the 1st to 6th.

The Ohio river was at a comparatively low stage throughout the month.

The observer at Chattanooga reports that the water in the Tennessee river during the month has averaged lower than for any corresponding period of which there is a record; the stage of water has barely permitted steamboat navigation and has not been sufficient for rafting.

ICE IN RIVERS AND HARBORS.

Barnegat bay.—Barnegat City, New Jersey: the bay froze on the 20th and remained frozen until the 25th.

Casco bay.—Portland, Maine: the harbor was free from ice on the 31st.

Cedar river.—Cedar Rapids, Iowa: the ice broke up on the 24th.

Chincoteague bay.—Chincoteague, Virginia: the bay froze over on the 23d; the ice broke up on the 24th.

Connecticut river.—Hartford, Connecticut: the ice broke up opposite this city on the 28th; on the 30th the first steamer of the season arrived.

Delaware river.—Easton, Pennsylvania: the river froze over on the 21st for the first time during the winter; the Morris canal was also closed, and the Lehigh canal and river between this place and Mauch Chunk were covered with ice two inches thick. At this date in 1884 the Lehigh canal was open for navigation.

Des Moines river.—Des Moines, Iowa: the ice broke up on the 11th.

Ottumwa, Wapello county, Iowa: the ice broke up on the 4th.

Detroit river.—Detroit, Michigan: floating ice from 1st to 13th, 20th, 22d to 28th.

Eel river.—Logansport, Indiana: the ice began to break up on the 13th; floating ice continued until the 20th.

Gardiner bay.—New London, Connecticut: reports from the bay on the 24th stated that both entrances were filled with large masses of ice.

Genesee river.—Rochester, New York: the ice broke up and passed out of the river on the 31st, causing no damage.

Hudson river.—Menand Station, (near Albany) New York: ice formed continuously until about the 25th, when it was about three feet in thickness.

Poughkeepsie, New York: on the 30th the river was open as far north as New Hamburg, ten miles south of this place.

Newburg, New York: the tug "Conqueror," with barge "Homer," forced passage through the ice from New York City to this place on the 29th; this was the first arrival of the season.

West Point, New York: ice in river broke up on the 27th; the first steamer of the season arrived on the 30th.

Kansas river.—Manhattan, Riley county, Kansas: the ice in the river broke up on the 1st.

Lake Champlain.—Troy, New York: reports from the lake on the 28th stated that the ice was three feet thick.

Lake Michigan.—Milwaukee, Wisconsin: at the close of March the lake was covered with heavy ice, preventing navigation. The iron propeller "Michigan" was nipped by the ice and sunk on the 19th.

Grand Haven, Michigan: the harbor entrance continued blocked with ice during the entire month, and with the exception of the arrival and departure of the propeller "Wisconsin" on the 11th, navigation was suspended. The "Wisconsin" cleared Milwaukee for this port on the 16th and arrived within twenty-five miles of the eastern shore of the lake, where she firmly lodged in the ice; she drifted with the ice until the 20th when a large hole was stove in her side; three hundred tons of freight were thrown overboard in order to save the vessel. On the 31st the propeller had drifted to within eighteen miles of this port.

Manistique, Schoolcraft county, Michigan: on the 31st the ice in the harbor was sixteen inches thick, and the lake was